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Special Committee on the
operations of the Government
in the field of, 1952/53
(HOUSE OF COMMONS

Seventh Session—Twenty-first Parliament
1952-53

SPECIAL COMMITTEE

on the
Operations of the Government
in the field of

ATOMIC ENERGY

Chairman: G. J. McILRAITH, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE [and
No. 4 reports]

MONDAY, MARCH 30, 1953

WITNESSES:

- Mr. William J. Bennett, President and Managing Director, Eldorado Mining and Refining Limited, and President, Northern Transportation Company Limited;
Mr. Marc Boyer, Deputy Minister, and Dr. John Convey, Director, Mines Branch, Department of Mines and Technical Surveys.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1953

MINUTES OF PROCEEDINGS

MONDAY, March 30, 1953.

The Special Committee appointed to examine into the operations of the Government in the field of Atomic Energy met at 10.00 a.m. The Chairman, Mr. G. J. McIlraith, presided.

Members present: Messrs. Coldwell, Gibson, Green, McCusker, McIlraith, Murphy, Murray (*Oxford*), Stuart (*Charlotte*), and Winkler.—(9).

In attendance: W. J. Bennett, Esq., President and Managing Director, Eldorado Mining and Refining Limited, and President, Northern Transportation Company Limited.

Mr. Bennett was questioned in relation to his evidence given on March 25 on the operations of Eldorado Mining and Refining Limited and of Northern Transportation Company Limited.

The witness retired.

At 11.15 a.m., the Committee adjourned until 3.30 p.m. this day.

AFTERNOON SITTING

The Committee met again this day at 3.30 p.m. The Chairman, Mr. G. J. McIlraith, presided.

Members present: Messrs. Brooks, Gibson, Green, Low, McCusker, McIlraith, Murphy, and Murray (*Oxford*).—(8).

In attendance: Mr. Marc Boyer, Deputy Minister, and Dr. John Convey, Director of Mines Branch, both of the Department of Mines and Technical Surveys.

Mr. Boyer was called. He outlined briefly the organization of the Department of Mines and Technical Surveys and also the functions of the Department, through the media of the Geological Survey of Canada and the Mines Branch, in the field of atomic energy. He also tabled copies of the following documents for distribution to members of the Committee:

1. URANIUM OREBODIES—How Can More be Found in Canada?
2. PROSPECTING FOR URANIUM IN CANADA.
3. CANADIAN DEPOSITS OF URANIUM AND THORIUM (Interim Account).

Dr. Convey was called. He gave detailed evidence on the organization, functions, and activities of the Mines Branch of the Department of Mines and Technical Surveys in the field of atomic energy and was questioned thereon. The witnesses retired.

At 4.30 p.m., the Committee adjourned to the call of the Chair.

A. SMALL,
Clerk of the Committee.

EVIDENCE

MARCH 30, 1953

10 a.m.

The CHAIRMAN: Order. We have Mr. Bennett back with us. He is the president of Eldorado and he is now open for examination and questioning. Perhaps if there are general questions we can have them first and then go through the brief page by page.

Mr. W. J. Bennett, President and Managing Director, Eldorado Mining and Refining Limited, Ottawa, called:

By Mr. Green:

Q. I should like to ask Mr. Bennett about the extent to which people outside the government are producing uranium ore.—A. Are producing what?

Q. Are producing uranium ore?—A. At the present time?

Q. Yes. As I understand it, the original policy was that no one was allowed to produce ore except under direction of the government. And then that policy was dropped and the government allowed free exploration and unrestricted production, but no purchase by anyone other than the government agency.—A. That is correct.

Q. I would like to know to what extent non-government activities are under way, and what the results have been?—A. The most interesting area is the so-called Beaverlodge area in Saskatchewan and while there are no companies in actual production—that is, no companies which have started to mine ore, or to mill—there is one new property in particular, in the Beaverlodge area which shows great promise. This property was discovered about two or three months ago. At this time, it gives evidence of being a very large producer.

There are also in the Beaverlodge area a number of smaller properties, but it is a little early to say as yet whether they are going to be producers. Some of them may be tributary to the Eldorado operation. I mean by this, that if the tonnage is such that it does not pay the company to build its own mill, and if the property is reasonably close to the Eldorado mill, then Eldorado will buy its ore and treat it in the Eldorado concentrator at Beaverlodge.

The concentrator has been designed to handle custom ore. In other words, provision has been made for the treatment of ores other than Eldorado ores.

At this point I should like to say that the only area where we can speak with any certainty of new production is the Beaverlodge area. However other areas have been prospected. Several years ago there was some excitement in an area close to Sault St. Marie. A large number of claims were staked, and some underground work was done on several of these claims. But they did not turn out to be producers. I think the Soo field is pretty well dormant now. Consequently at the moment, the Beaverlodge area is the most interesting. This does not necessarily mean that uranium deposits will be confined to that area. But so far, it is the only area, where we have any certainty of new production.

Q. Is the mining community of Canada taking an active interest in the search for uranium ore, or is it being left largely to you?—A. Up until the

discovery of the particular property of which I spoke a moment ago—the Gunnar property—it would be correct to say that there was not too much interest on the part of the mining industry.

There were several factors which account for this lack of interest. One was the very great interest in other base metals, during the post-war period. The second was the uncertainty as to what the future of uranium might be apart from its military uses. When you consider that it takes anywhere from three to five years, depending on the location, to get a property into production, and when you consider that today it costs close to \$1 million to sink a prospect shaft and to do even preliminary underground development, you can understand the hesitancy to commit shareholder's money to exploration programs in this particular field.

The third reason was the widespread impression that deposits in commercial quantity would be rare. After all, up until the war, there had only been two major discoveries of uranium, one in the Congo, and the one at Great Bear lake. Other deposits had been discovered, but these were not of a major character. For example, there was the deposit at Joachimsthal, in Czechoslovakia and the carnotites in the Colorado plateau. There was the belief that uranium was an extremely rare metal despite the fact that the geologists had told us that, considered in the abstract and not in terms of commercial deposits, it was not one of the rare metals. If I may seek the opinion of one of our experts: Dr. Lang—what is it, the 27th most commonly found metal?

Dr. ARTHUR LANG: The main thing is that occurrences are very common, but ore bodies are very scarce.

By Mr. Green:

Q. It seems clear now that there will be very extensive use of atomic energy for peacetime purposes, and that would mean, of course, there would be great demand for uranium. Is there any way in which the finding and developing of uranium can be furthered in Canada?—A. I had not quite finished what I was going to say. With the discovery of the Gunnar property, the attitude of the mining industry seems to have changed. I see quite a number of people in the industry in the course of a week and I find that there has been very great interest in the last couple of months. We always felt, those of us who were concerned with the raw materials program, that the only thing that would really interest the industry and the prospector in particular, would be a major discovery. The Gunnar find would appear to have confirmed that view. There is great interest now on the part of the public, as you probably have gathered from the market performance in the last two months or so. While I do not have the figure for the amount of money that will be spent in the Beaverlodge area this year on surface development, diamond drilling, and so on, I would imagine it would be quite substantial. There are many companies in the area which either have claims or have taken options on claims on which exploration work will be done.

Q. That is apart from expenditure by Eldorado?—A. Yes.

By Mr. Gibson:

Q. Could you outline the means by which you compensate prospectors? On how many occasions have you paid out this \$1,000 for discovery?—A. You understand, of course, these are prospectors working for Eldorado.

Q. Yes, that is what I was thinking of.—A. There have been two occasions, one involving the Ace property which we hope to bring into production next month, and the other involving the Martin Lake property which I referred to in my brief. In these cases the prospector's agreement in effect at the time the discoveries were made, was not the same as the agreement now in effect.

By Mr. McCusker:

Q. What is the distance between the Ace, the Martin Lake, and the Gunnar property?—A. The Gunnar property would be approximately 20 miles from the Ace as the crow flies.

Q. Was it discovered by a private individual?—A. By prospectors.

Q. Has it been developed by one of the mining companies?—A. I am not too clear on what happened but I believe the ground staked by prospectors in the normal way and the prospectors made arrangements with the Gunnar company. I am not familiar with the details.

Q. Who controls the Gunnar company?—A. Gilbert La Bine is the president.

Q. It is a new company?—A. It is an old company. Gunnar Gold Mines Limited it is called.

Q. Have they other properties?—A. The company had gold property. It is new in this field but not new as a company.

By Mr. Green:

Q. To what extent has Eldorado purchased uranium ore from private sources?—A. We have not purchased any as yet because there are no properties in production.

Q. That means, in effect, for several years there has been nothing purchased?—A. Nothing so far.

Q. The only uranium ore produced in Canada is produced by Eldorado?—A. That is right. The reason nothing has been purchased is that nothing was discovered that was capable of being developed into a commercial producer. Even our own new property is not in production yet, and we made the first discovery in the post-war years.

Q. That is the Bear Lake property?—A. No, I am talking about the new property at Beaverlodge.

Q. What is the attraction of guaranteed prices for uranium ore, as against a free market?—A. With the uncertainty as to the future of uranium after the demand for military use ceases, it was felt the only way we could interest the mining industry was by establishing a period during which there would be a guaranteed base price, otherwise the industry would not look at uranium. Now, I think, as you do, though I do not think anybody can speak with certainty—

Q. I am not sure how I think.—A. I think the developments in the last year in the field of civilian application have been such that the attitude of mining industry may change. Certainly up until a year ago there was considerable doubt as to what the demand would be. The mining industry in this country, as in other countries, had had experience with other metals for which there was little demand during peacetime. During the last war, as you know, we tried to stimulate the discovery and production of certain metals, for which there was little demand in peacetime. You have to keep in mind also that uranium has had no commercial history, unlike copper, nickel and the other base metals. There was a certain reluctance to get in uranium on that account.

By Mr. Coldwell:

Q. To what extent are you impeded by difficulties of access to these fields? Is there any chance of pushing a highway to Lac La Ronge?—A. Beaverlodge is quite a distance from Lac La Ronge. I do not know the exact mileage from the end of the present highway to Beaverlodge.

Mr. McCUSKER: Lac La Ronge is considerably east of it for a jumping off place.

Mr. COLDWELL: I think it would be 300 miles.

Mr. McCUSKER: I think they would have to go further west.

Mr. COLDWELL: That might be so.

The WITNESS: There is no doubt the limitations imposed by the seasons in that country present a very great problem.

By Mr. Green:

Q. We hear quite a lot about the presence of uranium in Ontario and that its development has been purposely held back. Is that correct?—A. No, on the contrary we have been doing everything to get people to produce uranium regardless of its location. The officers of the Department of Mines and Technical Surveys who are present could, I believe, give you a description of the Ontario deposits and what they mean in terms of the present price structure. So far no one has ever proven any tonnage. The occurrences are of a kind or type which are fairly common throughout the world. Nowhere that I am aware of has any commercial tonnage been developed in this type of occurrence.

By Mr. Coldwell:

Q. Somewhat similar to bauxite which I think is rather widely distributed, but not in sufficient quantities to warrant development?—A. You do not find it in ore bodies. I hesitate to speak about technical subjects in the presence of the experts from the Department of Mines and Technical Surveys.

The CHAIRMAN: We will be having another witness from the Mines Department later on, and perhaps he would be the one to question on that subject.

The WITNESS: Actually uranium is found in many places for example in the phosphates in Florida there is reputed to be large quantities of it, but it is, very widely disseminated so that you get a very small quantity in each ton of material; it is also found in certain shales. And in certain of the granite rocks in the Pre-Cambrian Shield. In fact quite close to Ottawa, you can find very low radioactivity in the granite rocks.

By Mr. Green:

Q. What further production would there have to be in Canada in order to warrant the complete refining of the uranium ore in Canada?—A. I cannot answer that question accurately at this point. First of all I could not answer it without giving you a production figure, and this I would have to do *in camera*. Apart from the security problem we have not as yet worked out the economics of metal production. We do have, I believe, a fair idea of the technique, but we have not yet worked out the economics to the point where we can say at what level of tonnage it is economic to produce metal.

Q. We do refining—partial refining?—A. That is right.

Q. But the balance of refining is done in the United States?—A. Purification and conversion to metal is carried out in the United States.

Q. Could we do that here in the foreseeable future?—A. I would think so. In the light of the new finds I think it would be a definite possibility.

Q. Is refining done at Port Hope?—A. Do you mean, is the product of Port Hope brought to the point where it can be used in a reactor?

Q. That is right.—A. No. The final stage is carried out in the United States.

Q. That is the only market for uranium?—A. Yes, the United States Atomic Energy Commission.

Q. Does the company give any aid to private companies at a technical level?—A. Yes, we have, in conjunction with the Department of Mines and Technical Surveys, given all the technical assistance that we have been able to give at the exploration level, at the mining level, and at the assaying and

milling level. This has taken several forms. One has been the distribution of technical articles, another has been the bringing to Beaverlodge of certain people in the industry who are interested or who have properties. These persons have been shown over the property and have been given the benefit of our experience with such things as the interpretation of diamond drilling results and so on. We have gone all out in this regard.

By Mr. Coldwell:

Q. Is there co-operation with the provinces in regard to exploration, prospecting and that kind of thing? In Saskatoon they are doing something along these lines. What co-operation is there with the provinces in respect to exploration?—A. I understand the government of the province of Saskatchewan has been assisting the prospector. I am not too familiar with the details of the program. The department of mines in all the provinces are always helpful to those who are engaged in exploration or mining. So far the only important discoveries of uranium have been made in Saskatchewan.

Mr. GIBSON: Would you have authority at the Eldorado company to enter into financial agreements on a minority shareholder basis with an owner of the property or even with a majority? Do we compete at all with private financing in a field like that?

The WITNESS: I do not suppose there is any question that Eldorado has the authority, but as a matter of policy we have not become involved in any companies where we would be a major or a minor shareholder. The reason we have not is that we believe that a company owned by the government should avoid participation in companies, the stock of which is being traded. So we have stayed away from that type of arrangement.

Mr. GIBSON: There would be nothing to stop a private prospector if he had a good prospect of bringing it in to you?

The WITNESS: No. What we would do if a private prospector wanted to make a deal with Eldorado would be to adopt an arrangement fairly common in the industry, that is, instead of incorporating a separate company and giving the prospector shares, we would give the prospector a cash settlement and a royalty. We would not participate as a shareholder in a new company.

Mr. GREEN: You would get yourself into a lot of trouble if you did.

Mr. McCUSKER: Is there a power site in the vicinity of Beaverlodge?

The WITNESS: At the present time we are getting our power from a site that was developed by Consolidated Mining and Smelting.

Mr. McCUSKER: Goldfields?

The WITNESS: Near Goldfields, at this site at the present time there is an installed horsepower of 3300. That is not sufficient to provide the power that we will require when we go into production next month. We have had to supplement this hydro power with a diesel plant, since we will need approximately 5,000 horsepower at peak demand. About half the power is coming from the hydro development at Consolidated and the other half from the diesel plant.

Mr. McCUSKER: Are you taking all Consolidated can produce?

The WITNESS: We have leased the plant and we are taking all the plant will produce and in addition we have had to build a diesel plant. The question of power is a very lively one at the moment. We have had a survey under way since late in 1951, the object of which is to try to find out if we can get more power from the present waterhead or whether we have to go elsewhere. There is no question that more power is going to be needed. The cost of diesel in the area is prohibitive. The fuel cost alone is 2 cents per kilowatt hour.

By Mr. Stuart:

Q. How is that fuel taken in?—A. By tanker barge.

Q. In barrels?—A. No. In barges. There are compartments in the hold of the barge.

Q. Do you know what the cost of fuel oil would be under those circumstances delivered?—A. I can obtain the exact figure. I believe it is close to 30 cents a gallon.

By Mr. Gibson:

Q. On this Northern Transportation Company, you carry 80 per cent of the traffic up there I understand?—A. Yes.

Q. Does the Department of Transport maintain docking facilities there? Do they maintain the roads for those two portages you have?—A. Most of the docks, with two exceptions, were constructed by the Department of Public Works. The new dock at Bushell, which is the port for the Beaverlodge area, was built by the Department of Public Works, and, in accordance with the usual practice, was turned over to Transport for administration. The dock at Fort Fitzgerald was built originally by the Northern Transportation Company, but two or three years ago the Department of Public Works rebuilt it. The dock at Bellrock on the north end of the portage was also built by the Department of Public Works. All these docks are maintained by the Northern Transportation Company.

Q. Why?—A. On those particular sections of the route Northern is the only Company using docks. Northern has leased the docks and pays the Department of Transport a rental fee based on tonnage.

Q. Would private individuals have access to these facilities?—A. If they wanted to use them subject to the usual regulations governing wharfage fees. So far there has not been a case of anybody using them.

Q. No difficulty that way?—A. No. The highway at Fort Smith is a Northern Transportation project. It is maintained by the Northern Transportation Company.

Q. Is it a toll road in the case of private individuals?—A. No. It is open.

Q. You have done something to develop this country up there?—A. I think so. Yes.

The CHAIRMAN: That is an understatement!

By Mr. Murphy:

Q. Does your company pay income tax to the government?—A. Yes, starting this year.

Q. I think you gave the other day the profit for last year?—A. I gave the gross for the years 1946 to 1951. I will be glad to give you the figure for last year. It was \$1,100,00. This is not necessarily the figure our tax would be based on because the Income Tax Division, as you know, disallows certain things as item of cost.

Q. You mean because of your particular operation?—A. Yes. I mean we are the same as the normal industrial corporation.

Q. That is what I mean, a mining company.—A. Income tax has fixed rates for depreciation, for example, which may not correspond to the rates which are considered adequate by the management of a company.

Mr. GIBSON: They treat you exactly the same as a private company?

The WITNESS: Yes.

By Mr. Murphy:

Q. Your year ends in December?—A. Yes.

Q. Do you have other properties other than Port Hope where you operate, or just the mines?—A. We only have the three operating divisions: Great Bear Lake, Beaverlodge, and Port Hope.

Q. Do you pay municipal taxes at Port Hope?—A. Yes. There was no change made at the time of the expropriation.

Q. When you took it over you continued to pay?—A. Yes. No change was made in the previous practice.

Q. Do you know what you paid last year?—A. No, but I could find out.

By Mr. Green:

Q. Is Eldorado carrying on an active exploration program in any other area but Beaverlodge?—A. We have an exploration division which is separate from the mining operation. Last year, last December to be exact, as a result of a discovery that was made by one of our prospectors, we staked a block of claims in the Foster Lake area of Saskatchewan. We are going in there as soon as the ice goes out. We will do ground work and also an aerial survey with a helicopter. We have continued to carry out exploration programs because we have felt during the years since the war that we had to lead the way in this business. The discovery of the Ace mine in the Beaverlodge area is responsible for the other discoveries which have been made recently in the same area. We did, if nothing else, destroy the myth that you could not find another uranium property of commercial value.

Q. But you are not carrying on exploration activities in any other province?—A. Not so far. There is no reason for this other than that we have not had anything come to our attention so far in other parts of Canada which has been of any particular interest. That does not mean that there never will be. This is a peculiar game, this exploration for minerals. The discovery in New Brunswick is an indication of what I mean. There you had an area the geology of which had been known for years. Yet only very recently was there a major discovery of base metals.

Q. That is, in addition to your exploration activities, the Geological Survey are working in various parts of Canada and may run across something of that nature?—A. Yes, Doctor Lang of the Geological Survey will be available, to give evidence as to the part the survey is playing in the program.

By Mr. Gibson:

Q. I see by your formula here that it works out so that you pay less for high-grade ore than you do for low-grade ore. Is this to encourage production?—A. Yes. Mining economics are generally based on the cost per ton of ore mined, milled and sorted. If you have a high uranium content, the unit price per pound content might be less but the gross value per ton would be more.

Q. You still think this formula will take care of handling high-grade ore that is disseminated in a lot of country?—A. Of course that would not be high-grade ore.

Q. I mean, it might be in very small streaks, high-grade.—A. When you speak of high-grade, I am thinking of the percentage of uranium content per ton of rock.

Q. You mean mining?—A. That would have something to do with it. Basically, when you look at the economics of a mining property you say the value of the ore is so many dollars per ton in place before you mine. My point is that while this formula will give a higher price per pound of U_3O_8 per ton as the grade goes down, it would still be more profitable to have a high-grade ore because you would get more money per ton of ore, despite the lower price per pound of uranium content.

Q. But it is a bit of subsidy in a way to low-grade producers to try to get them to develop?—A. That is right.

The CHAIRMAN: Any other questions? We have an answer to the question asked by Mr. Murphy on the tax paid at Port Hope.

The WITNESS: That figure amounts to \$4,904.

By Mr. Murphy:

Q. That is the municipal taxes you pay at Port Hope?—A. Yes.

Q. What is the assessment there, do you know that? Is that about the same amount you paid when you took the plant over?—A. The rate has probably gone up.

Q. What do you carry the plant on your books at?

The CHAIRMAN: We will get that information. Any other questions?

The WITNESS: I was asked about our profits in 1951. In 1951, \$1,505,645; in 1950, \$1,160,171. That is, of course, before taxes. We were not paying taxes in those years.

By Mr. Gibson:

Q. You get the full price that Canada receives for this metal, do you?—A. I beg your pardon?

Q. Your company receives the full price from whoever the purchaser is? Your company receives the full price for it?—A. That is right.

Mr. GREEN: You deal directly with the United States Atomic Energy Commission?

The WITNESS: Yes. At the present time we are in the position of a prime contractor of the United States Atomic Energy Commission.

Mr. GIBSON: You are not on cost-plus?

The WITNESS: Security does not permit me to discuss the details of our contracts.

Mr. McCUSKER: Then we purchase back the rods that are used at Chalk River?

The WITNESS: That is Doctor Mackenzie's department.

Mr. GREEN: You make all the money and he has to take all the losses?

The WITNESS: It depends on the point of view.

The CHAIRMAN: We have the answer to one other question here. It was a question on the price of fuel oil asked by Mr. Gibson.

The WITNESS: I was a little high on that 30 cents. It is 24.6 cents a gallon, that is landed at Beaverlodge. That would be at the mine.

Mr. GIBSON: It costs me nearly that landed in my basement here in Ottawa.

The CHAIRMAN: Of course it is a different grade oil.

By Mr. Stuart:

Q. How far would that be transported by water?—A. Roughly, 300 miles.

Q. Then, of course, it is moved by rail? It comes from the Edmonton area?—A. Yes.

Mr. GIBSON: That is pretty cheap fuel, relatively, for that area.

The WITNESS: For ordinary use it may be cheap, but for power purposes it is high.

Mr. COLDWELL: How long is the transmission line between the mine and the power plant?

The WITNESS: As the crow flies, it would be about 25 miles.

By Mr. Murray:

Q. Do you process or refine cobalt at Port Hope?—A. We are not refining cobalt. We have a small production of cobalt as a by-product. It is a straight by-product. It is sold to the Delora refinery, which is the only cobalt refinery in Canada.

Q. Is the price of cobalt coming down?—A. I do not know the exact price at the moment, but I think in line with the other base metals it has probably fallen off a bit.

Mr. GREEN: Can we have a statement on the salaries paid by the two companies?

The CHAIRMAN: I do not want to put on record the mining company's salaries.

Mr. GREEN: Why not?

The CHAIRMAN: It is a simple matter. It is a competitive operation. It is just a matter, if these salaries are known, of another company going in and taking the staff away.

Mr. GREEN: I mean the officers of the Crown companies.

The CHAIRMAN: We are into the same problem there. I want to give the Committee all the information there is, but we are into the same problem there if we start publishing these salaries paid by the operating company.

Mr. GREEN: Doctor Mackenzie said we could have the atomic energy salaries.

Mr. MURPHY: We have them for Polymer. I know recently we have not asked the question, but some years ago we had the information on the executive officers, manager, vice-president, and so on.

The CHAIRMAN: Well, I do not know. I would want to look at that question again. Do you want it published? I will examine the question, but I am afraid there will be objection to it.

Mr. GREEN: I thought the principle had been pretty well established that the salaries of officers of the Crown companies should be made available to the Committees.

The CHAIRMAN: You would not want the salaries of the operating men? I hesitate to put that on the record. I would want an opportunity of considering it.

Mr. GREEN: I am not asking for the salaries of the technical men. I understand that information should not be produced, but I do think that the House committees should be entitled to know the salaries of the officers of the companies.

The CHAIRMAN: Are you asking that that be published in the evidence, or are you asking that the Committee have it?

Mr. GREEN: I think it should be available just like any other evidence.

Mr. GIBSON: I wonder if it could not be treated as classified information?

Mr. GREEN: Why?

Mr. GIBSON: I wonder if there is any particular virtue in that.

The CHAIRMAN: We have never given it and I do not know—we have never done it and if you start putting that information out—

Mr. GREEN: For example, the salary of the president of the Canadian National Railways has been given this session for the first time.

The CHAIRMAN: Yes, but the president of the Canadian National Railways has a salary that, I think, is a statutory matter or must be approved by order in council.

Mr. GREEN: This is the first year that his salary has been given.

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The CHAIRMAN: I am quite sure it is approved by order in council.

Mr. GIBSON: That is where the information came from, isn't it?

The CHAIRMAN: Yes.

Mr. McCUSKER: I think we should give our Chairman an opportunity to consider this.

The CHAIRMAN: I would like to consider it; I see a great many objections to putting it on the record. We are in a competing business, after all.

Mr. GREEN: Well not in the case of a Crown company.

The CHAIRMAN: Oh, yes, it is a purely commercial operation that is being carried on, as I see it. There is no point in putting out a lot of information that is going to be used to destroy your operation. Other mining businesses are not putting that information out.

Mr. GREEN: They would have to give that information to shareholders.

The CHAIRMAN: I do not know whether they do publish that to a shareholder.

Mr. GIBSON: Some do.

Mr. GREEN: The shareholders of a Crown company are in fact the taxpayers of Canada, and surely that information should be available to them.

The CHAIRMAN: Well, I have always taken the view that I rather welcomed the setting up of the Committee to get information about the operations; because of the nature of the operations and the history in the earlier years it was not possible to give much information on this whole subject of atomic energy. I come here with the view that we want to let out all the information that can possibly be put out. This is the first time, I think, that we have been asked for anything that we have not at once put out, and I would like to consider it.

Mr. GREEN: Well, I asked Doctor Mackenzie about it a few days ago and he said there would be no objection to giving the figures.

The CHAIRMAN: Will you leave the question with me and I will consider it. Now, is that all that we want to ask Mr. Bennett? If that is all, I will thank him.

By Mr. Green:

Q. There is one other question about the Northern Transportation. Is it operated at a profit or at a loss?—A. At a profit.

Q. You get that profit from other government agencies?—A. Northern Transportation is a common carrier. As a common carrier, its position in relation to the parent company is no different than in relation to any other shipper. Its rates are fixed by the Board of Transport Commissioners, so that the transactions between Northern and Eldorado, so far as the carrying of freight is concerned, are exactly the same as they are between Northern and Giant, Yellow Knife, or any of the other mines in the area.

Q. The bulk of the business would be done with Eldorado, would it not?—A. No. About 50 per cent of the business is done with Eldorado. But it varies from year to year. I would say, as a rough average, that about 50 per cent of the tonnage we carry is for the account of Eldorado, and 50 per cent of the tonnage we carry is for the account of other shippers, principally at Yellow Knife.

Mr. WINKLER: Is the boat known as the *Expeditor* in use by Northern.

The WITNESS: No.

By Mr. Murphy:

Q. With these new claims being developed in the area, would not your production be greatly increased this year in any event because of that?—A. You mean at the Ace mine?

Q. No. I mean the other companies, the private companies?—A. No. That would take a bit of time.

Q. Perhaps next year?—A. I would think that the minimum period is about two years. You have to build a mill. To give you an idea of the time factor, let us assume that one of these properties is now in a position to estimate what its tonnage is going to be. The company would have to determine what ore process was going to be used in order that the mill could be designed and equipment and supplies ordered. Under these circumstances the best schedule that could be met would be the delivery of supplies and equipment at the opening of navigation in 1954, which would be around the 1st of June. Then there would be a period of at least a year for construction.

Q. Have you anyone who could give evidence with respect to the size of the area and as to the assays or the results of exploration?—A. Do you mean our own, or the whole picture?

Q. No. The whole picture.

The CHAIRMAN: We have a witness who would be the man to speak on that.

The WITNESS: Dr. Lang is responsible for maintaining the inventory of uranium discoveries.

By Mr. Murphy:

Q. To what extent have you worked on your own claims in this new area?—A. First, we have the Ace property which is going to be a producing mine, we hope, next month and adjoining it is what I have described as the Martin lake property.

Q. Yes?—A. There we are doing underground development. We are also getting ready for mining. The Martin lake group of claims is contiguous to the Ace. Then, to the east of the Ace, on the so-called St. Louis Fault, which is the structure on which the original discovery was made, we are carrying out quite an extensive diamond drilling program. About six miles from the Ace, we have a block of claims on which we are also carrying out a diamond drilling program.

Mr. MURPHY: Would that be east of the Ace?

The WITNESS: That would be northeast of Ace. These are programmes apart from the work in the Foster lake area.

By Mr. McCusker:

Q. Does the underground temperature in these mines vary greatly from the underground temperature, let us say, in the mines in northern Ontario?—A. No.

Q. What are those temperatures, approximately?—A. We have to ventilate these mines quite thoroughly throughout most of the year. When you ventilate mines so far north, you also have to heat the air. If you did not heat the underground air, I suppose the temperature underground would be somewhere around 45°.

Q. But would not 45° be a favourable temperature in which to work? Perhaps they would work a little harder at a temperature of 45°?—A. It would if we did not have to ventilate. But the moment you start ventilating, you bring in sub-zero surface air, so you have to heat. These heaters, of course, do not work in the few warm periods which we get in summer.

Q. Why is it necessary to ventilate?—A. Ventilation is a problem in every mine.

Q. Because of gas?—A. We have no evidence at the moment that there are any conditions underground which are different from what are found in other mines. But despite the fact that we have no evidence that there is any special hazard, we feel it best not to take any chances.

Q. Have you had any trouble with water seepage?—A. Oh, yes. The Great Bear lake mine is a very wet mine. We pump 800 gallons a minute. That will give you an idea of the amount of seepage.

The CHAIRMAN: Thank you, very much, Mr. Bennett.

The WITNESS: I have the Port Hope figure. It is \$1,206,000. That is not the assessment; that is the book value of the plant.

Mr. MURPHY: You have not got the assessment?

The WITNESS: No, but I can get it for you. Then you asked about the number of shareholders, the other day. We have had a little difficulty in securing this information. There were actually 5,909 cheques issued. Whether that represents the number of shareholders or not, I do not know, but I would imagine that it is fairly close.

The CHAIRMAN: Thank you, very much, Mr. Bennett. This afternoon we will have a witness from the Mines Branch of the Department of Mines and Technical Surveys. Dr. Convey will be leaving, and I would like to finish his evidence this afternoon. That is the reason for the extra meeting this afternoon which will be at 3.30. Thank you.

AFTERNOON SESSION

The committee resumed at 3.30 p.m.

The CHAIRMAN: Order. We have with us this afternoon Dr. Marc Boyer, Deputy Minister of the Department of Mines and Technical Surveys. It was my intention to call Dr. Boyer to tell us very briefly about the activities of the department in the field of Atomic Energy. Then it was my intention, with your approval, to call Dr. John Convey, Director of the Mines Branch of the Department of Mines and Technical Surveys and to deal today only with Dr. Convey's evidence.

Dr. Convey's branch is that of the Mines Branch, in which Mr. A. Thunæs is the chief of the Radioactivity Division, but we can call him later. As I explained to most of the members of the committee, Dr. Convey has to leave on Wednesday morning for Australia and I wanted you to have his evidence before he goes. If we could deal with Dr. Convey and leave the supplementary evidence until later, it would be very agreeable. I now call on Dr. Boyer.

Dr. Marc Boyer, Deputy Minister, Department of Mines and Technical Surveys, called:

The WITNESS: Mr. Chairman and members of the committee, the Department of Mines and Technical Surveys comprises five branches, the Surveys and Mapping Branch, the Geological Survey of Canada, the Mines Branch, the Dominion Observatory, and the Geographic Branch.

Of these five branches there are two only which have any connection with atomic energy. These are the Geological Survey and the Mines Branch. I believe you will find a difference in the presentation of any information we have

for you. You have just heard the difference between the Department and the Eldorado Mining Company. The Eldorado Mining Company is in production but we operate as a service department, offering service to the public and to the mining industry, with certain supervision of technical problems.

I should like to give you briefly the functions of the Geology Survey of Canada and the Mines Branch which are associated with atomic energy.

The Geological Survey of Canada first of all acts as official agent for the Atomic Energy Control Board in collecting and filing information on all occurrences of radioactive minerals with content of over 0.05 per cent of uranium or thorium oxides. It examines and studies as many deposits of radioactive deposits as its staff permits. It does geological mapping work specifically directed towards uranium in areas of known or possible importance to assist in prospecting and discovery of uranium ore deposits. It cooperates in the development of a suitable reconnaissance airborne instrument for detecting radio-active deposits. It makes, free of charge, radiometric tests for the amount of radio-activity in samples; it reports also on the identification of the particular radioactive minerals present in the samples received. It carries out laboratory research on the mineralogy and geology of radioactive deposits, and it prepares special reports and pamphlets on prospecting, Geiger counters, and uranium deposits.

The chairman will make available to you at the end of the meeting some of these reports, possibly to assist you in clarifying certain points before the presentation of the geological survey at a later stage in your meetings. (*See today's Minutes of Proceedings for list*):

The Mines Branch has two of its divisions connected with atomic energy. As to the Physical Metallurgy Division, it carries on investigational and development work on metallurgical matters in connection with the design, construction and operation of the Chalk River reactors.

The Radioactivity Division is concerned with development and application of suitable instruments and methods, physical and chemical, for efficient recovery of uranium concentrates from various types of ores.

Normally it might have been very helpful to the Committee if the Geological Survey presentation had been made before Mines Branch. It is more of a private service, not so much specialized as that of the Mines Branch. It might have given you general information on the areas where radioactive minerals can be found.

We have given assistance to prospectors and mining companies in locating, assessing, and in knowing more about possible potential areas for survey. But as your Chairman explained, Dr. Convey will be leaving soon for an extended trip, and it was easier to have him present the facts for you, before the Geological Survey.

That is all I have to say. I think that Dr. Convey will be better versed than myself on the scientific aspects to answer your questions or to give you an additional presentation of certain of the details.

The CHAIRMAN: Perhaps we can hear now from Dr. Convey, who is the Director of the Mines Branch of the Department of Mines and Technical Surveys.

Dr. John Convey, Director of the Mines Branch of the Department of Mines and Technical Surveys, called:

The WITNESS: Mr. Chairman and members of the Committee: At the outset I would like to emphasize that the Mines Branch is a technical research laboratory, a laboratory wherein we examine ores and minerals of all types. It

is our purpose to assist in the development of these ores from the point of view of processing them, and in that way to help the Canadian mining and metallurgical industry.

In the beginning the Mines Branch was interested mostly in the application of known technical methods to the processing of minerals. But with advancing times it soon became recognized that a broader field was necessary. Hence today we find that we have extended not only into the processing of minerals and the extraction of metals from ores, but into the actual development of metals and their uses, and into the development of new metals and the improving of existing alloys.

You will find that we have a budget of a little over \$2½ million, and what affects us in this particular Committee is that 16 per cent of that budget is spent directly on atomic energy work.

The Mines Branch is divided into six divisions. There is the Mineral Resources Division, and their function is to keep their fingers, as it were, on the pulse of the Canadian mining industry. It is not just a case of collecting statistics. We have a division wherein are engaged mining engineers whose sole purpose is to analyse from an engineering sense statistics associated with mining companies and the metallurgical industry.

Then we have the Radioactive Ores Division whose sole purpose in life is the processing of radioactive ores. Then there is the Mineral Dressing and Process Metallurgical Division who handle the processing of all metallic ores.

There exists the Industrial Minerals Division which attends to the processing of industrial minerals which includes clay, ceramics, asbestos and similar non-metallic minerals.

The Fuels Division which, in a broad sense, is interested in the development of the fuel industry in Canada. Their work takes them into the field of both solid and liquid fuels.

Last but not least, there is the Metallurgy Division who have as their purpose the development of the Canadian metal industry.

To be a little more specific, we have 16 per cent of our activity presently related to the atomic energy project. At the outset, it is one thing to find uranium ores, but it is quite a different task, and a more difficult problem, to process those ores.

In the beginning I mentioned that the Mines Branch activity was primarily the application of known techniques in the processing of ores. But unfortunately those ores of immediate atomic interest are of such low-grade metallurgical value that special techniques must be worked out for their processing. When you think that in the case of uranium ore the only part of it in which we are interested is one part in a thousand, you will realize that we have to get rid of the other 999 parts which we do not need. That is not an easy thing to do using the old techniques. We cannot use solely the gravitation method, where the differences in gravity between the constituents assists in their separation, and similarly with the floatation methods. But today we have gone a little further into the process than that, and it is now the function of the Radioactive Ores Division to work out techniques whereby we can process these low-grade ores.

Chemical methods have come very much to the front. In other words, we find that chemical metallurgy is growing today to such an extent that in the process of radioactive ores there are two main methods in use, the acid leaching process, and the basic leaching process.

As to the details of cost and so on, and the specific functions of the Radioactive Ores Division, I leave that to Mr. Thunaes.

We have a staff of some 69 in the Radioactive Ores Division. Our laboratory is located in modified quonset huts and available space is something which we find is rather at a premium today.

Our work up to the present since 1945, when this division was being set up, has been to provide assistance to the Eldorado Crown Company. But as you know, today private companies and private enterprise are entering this atomic picture and they expect the same service from us as we have been able to give to the Crown companies. That is a pressing problem which we must face now. The problem is: How can you spread your staff and facilities thin enough and still provide the type of service which is required?

That briefly gives you the picture, as it were, of the Radioactive Ores Division. In addition to the main processing of ores, we have a thousand and one other details to work out, both chemical and radiometric. In other words, we find that in the laboratory we must adapt ourselves to the times, and that being so, we are using techniques in analytical procedures which were not even thought of some 10 or 12 years ago.

As we get down to lower and lower grades of ore, the technical difficulties increase accordingly, and the problems become complex. In other words, we are faced with these ores which we can process today as well as the marginal ores which we cannot process economically, but which will provide the future source of uranium. In other words, it would be uneconomical now with modern techniques to process the lower grade of ores with which we may have to deal in probably 5 or 10 years.

We have to keep the present situation in mind and at the same time we must look towards the future. So in addition to an immediate solution of the problem wherein we carry out investigational pilot plant operations and so on, we must foster sufficient fundamental research to meet the low grade ore processing problems of the future.

In the Radioactivity Division we actually carry on from the test tube stage to the pilot plant operations. In fact, the milling processes and so on which are now in operation at Port Radium and which will be in operation in the Beaverlodge area were originally worked out in our Mines Branch laboratories. When a process is developed which proves successful, the staff has to be available to train the operators who will actually work with the process in the mills concerned. So we have a further dilution of staff and it is at times difficult to keep everything going. Fortunately we have not up to now been required to do actual work on the refining of uranium concentrates through to the finished metal, otherwise our facilities and staff would need to be expanded.

To get into the Metallurgical Section, in Canada at the beginning of the last war the Mines Branch I believe had a staff of less than 12 in metallurgy. As you know the last war was fought on the development of weapons where we used many scarce strategic metals and new alloys. Hence in Canada we were met with a problem of lack of staff and facilities. Fortunately we had such men as Dr. Camsell, Dr. W. B. Timm, and Mr. C. S. Parsons who had sufficient foresight to look into the future and develop or extend the facilities of the Mines Branch to such an extent that today we have on Booth Street the six divisions I have mentioned which exist as one integrated mining and metallurgical family. There is no one independent of the other. The Metallurgy Division has today a staff of around 150. This division is broken down into sections. We have a section on steel, one on cast iron, another on non-ferrous metals, a section on mechanical testing, metaphysics, the metal forming and the welding section, in addition to the high temperature alloy section. As you can see, with time these various sections have grown up and when you add to them the nuclear metallurgy section you have a cross sectional view of metallurgy as it exists today.

To come more clearly to the purpose in mind here today, that of atomic energy: As you know, the lifetime of the reactor as we know it is controlled by the materials that go into it, primarily the metallic materials, and especially the uranium itself. As I mentioned, we have difficulty extracting that metal which is one part in a thousand in ores but add to that the fact that you have got to get rid of all the impurities from the refined uranium. It is the presence of the odd little impurity that will upset the whole nuclear action, hence careful examination of all rods for impurities and flaws is essential. Hence in building a reactor the nuclear material that goes into it must be very carefully selected because the uranium metal must be very pure. If one puts sufficient uranium of a certain type together in a pile you can produce a chain reaction. On the other hand, if one places ordinary uranium in a pile, I doubt if you would get the result you look for; however, if you can moderate the reaction so that you can produce the correct nuclear conditions you would have a pile such as at Chalk River. Hence the use of a moderator is required and the pile consists of a number of uranium rods suspended and submerged in a pool of heavy water. Unfortunately the uranium rods must be protected from the heavy water. Corrosion takes place and the uranium rods must be sheathed. That is where the choice of sheathing metal enters the project. The material must be such as to reduce corrosion and withstand the ambient pile temperatures and above all it must not prevent nuclear chain reactions. That last little phrase rules out a lot of the commonly known metals which we have today. So we must use those metals that are available and at the same time the staff must do sufficient investigational work to produce new alloys that can be used in the actual reactor. Hence one section of the metallurgy division is engaged in the search for new alloys. This means research for an alloy that can resist corrosion and is ductile enough to allow the sheathing of a bar of uranium. New reactors are required that can be operated at higher power. So again the metallurgist is saddled with the problem of what alloy can be used and so these investigations appear to have no end.

Now, suppose we have the alloy. We have as you know the metal aluminum which we are using at present. You want to sheath a rod and design the reactor such that a minimum amount of uranium to produce a desired end result is used and no more. Hence as much nuclear material must be packed into as small a space as possible. That being so the shape of the rods you put into the reactor enters into the picture, so much so that in the new reactor under design today, the research engineer must team-up with the nuclear physicist. A nuclear-physicist can tell you what shape of rod he wants but the metallurgist makes known the possibility of the sheathing of such rods.

Hence it is a case of physicist and engineer working together and with a little time and effort the ideas of both are married and a new development is born. Such a solution is not always as simple as it sounds. New techniques for the sheathing of uranium rods of various shapes and dimensions are under investigation continuously, in addition to the never ending search for better sheathing metals. The next problem that comes along is that of the cooling operations in the pile. A chain reaction is accompanied with the creation of high temperatures. Dissimilar metals usually have different coefficients of expansion, then the uranium rods and sheathing metals must be critically examined for the possibility of the non-production of ruptures.

Now, imagine a reactor where you have two dissimilar metals under high temperature conditions; they have a tendency to pull away from each other. Once they do, there is the creation of voids and ruptures which will lead to disastrous results.

There is another metallurgical element of trouble that enters into the picture. A coolant must pass through the reactor. At Chalk River we want as

much of the Ottawa river flowing through the piles as possible to extract the heat which is generated. Thus the design of rods and metal containers must be such that coolants can flow around the segments concerned. Therefore the subject of corrosion appears re the metal from which you make your outer sheath and the cooling water.

Experience has shown that low alloys of certain metals are more corrosion-resistant than the parent metals. Such experience is found by time-consuming research work and heavenly-guided mistakes.

In the case of corrosion in the reactors, one must consider the treatment of the cooling water that is used. In addition the effect of the moderator, namely the heavy water, affects metallurgically the pile operation. Now, these two factors alone, namely, heavy water and coolant, provide a sufficient headache to keep one busy for a number of years, but on top of that again the fact exists that the pile materials are subject to intense radiation and metals have the strangest way of behaving under the effects of these extreme nuclear radiations. For instance, metals, in addition to other effects, show a tendency to distort under the influence of radiation. The success or failure in the operation of a pile depends upon the ease with which you can re-allocate the position of your rods, the speed you can get them into their appropriate positions and out again.

You can imagine what would happen where there is a close packed assembly of nuclear rods and one of them suddenly warps and controls cease to exist.

In the case of these chain reactors, one has not got five seconds to work but a fraction of a second. Hence it is essential to be as certain as one can that the metals used in pile construction are not going to misbehave. Hence operational research work is needed whereby materials can be examined metallurgically.

So two of the main metallurgical problems are the effects of radiation and the corrosion action of the medium on the metals used in reactors.

Another problem is the metallurgical examination of irradiated materials. One must work out a mechanism whereby this can be done, and the mechanics for unsheathing the material. This sounds like a simple task but unfortunately one cannot always get close to the material when it comes out of the pile. Protective shielding against harmful radiation is needed. The work is done by means of remote controls.

For instance, irradiated uranium rods are prepared under sufficient protective shielding for metallurgical examination, to find out just what has happened while those materials were in the pile. The physical characteristics of the materials such as mechanical strength and structure are determined for nuclear rods whose history is known prior to entry and after irradiation in the pile.

Those are typical tasks which are continuous with pile operation. Then the main structural materials are examined for possible changes with time while they are in the atomic energy pile. Steel structures, plumbing, etc., in particular are carefully investigated. So complex are the metallurgical problems in nuclear plants that a team of metallurgists is required who can pool their experience and so to arrive at an answer as to what materials can be used in pile operations.

So, in the Mines Branch we have various sections, with metallurgists experienced in both ferrous and non-ferrous metallurgy. Added to this, there are scientists trained in metal physics, who, with modern scientific tools, search into the inner structure of metals behaviour. The pile must be designed in such a fashion that should anything go wrong, and it requires repairs, then the practical engineer enters the project—the mechanical engineer and the welding engineer—and the ease with which these operators can bring about

first aid metallurgically is very important. So we find that today the experience gained in the past few years at Chalk River is all pooled and that experience has been used as a directive towards the building of the new reactor. I may say that our metallurgical engineers have spent an appreciable length of time with the C. D. Howe Construction Co. re the New Reactor. In other words, we learned after building the last reactor that there were certain deficiencies about it which we did not like, but fortunately it worked and has worked very well, and we expect the next one to do a little better, and the experience gained in the past we are applying to future problems.

I have described very briefly some of the more common problems met with by the Mines Branch staff in the atomic energy project, and the more detailed account of the radioactive treatments I have left for my colleague Mr. Thunaes to describe later. However a visit by you to the Booth street laboratories would amplify our remarks.

There is one phase of this work which is frequently overlooked, namely that the age of the pile is no longer than the time that the material can stand up to the conditions under which they must act. One can replace the nuclear rods, or the nuclear fuel, but the main structural material is also important. It is impossible to think we can do all the necessary scrutiny re materials used. We cannot. We do the best we can, but in order to try and facilitate this work, we have in Chalk River a section of the laboratory that at the present time has a meagre staff of six, five professional and one technician, and the Metallurgy Division of the Mines Branch has a staff of 150, sixty per cent of whom are professional; all of whom are cleared for atomic energy work. The team at the Chalk River plant itself is engaged in day to day project activities. They are engaged there in the examination of materials that have come out of the pile, and the materials going into the pile. When these materials can be examined in our main laboratory here in Ottawa, naturally we bring them down here.

You might think, why not build the same metallurgical set-up in Chalk River as exists on Booth street in Ottawa. I think the answer to this is that it would cost more than \$10 million to duplicate the facilities re equipment alone and a considerable time-lag in delivery of the same. In addition I do not know where you would get the staff at the present time. Hence there is a working agreement between Atomic Energy Crown Company and ourselves, in that we do the actual physical metallurgical work associated with the atomic energy project. In addition, in the Radioactive Ores Division, we work out processes whereby the operators can treat their uranium ores economically.

That, very briefly, gentlemen, gives you a thumb-nail sketch of what we are trying to do in the Mines Branch.

The CHAIRMAN: Thank you Dr. Convey. Any questions?

MR. GIBSON: Too many questions, Mr. Chairman. I am afraid that in the few minutes at our disposal we could not even start to go into the broad range of questions that might arise from this.

By Mr. Green:

Q. You work very closely with Atomic Energy of Canada Limited?—

A. Yes. In my own case, I visit Chalk River as a rule about once a month, and I have staff up there every week.

Q. You also work very closely with Port Hope?—A. Yes, but Mr. Thunaes could give you a better exposition on how we actually work hand-in-glove with them on pilot plant operations.

Q. You are responsible for working out the method of refining to a much greater degree?—A. Yes.

By Mr. Gibson:

Q. Do you take any students in the summer time that you can probably start in with their training?—A. Yes, we take in 20 summer students in the Mines Branch. We used to take in 39, but we were instructed to reduce that number for reasons of economy, very few into the atomic energy picture. By the time you have cleared them from a security viewpoint, the summer has gone.

Mr. BROOKS: In your Geological Survey Branch, are you finding any radium ores in other parts of Canada?

The CHAIRMAN: That would not be Dr. Convey's subject. He would not be able to answer that. Mr. Bell, our witness next day, would be able to answer that.

By Mr. Gibson:

Q. Dr. Convey, that was an interesting comment you made that by the time you cleared them the summer would be over. Is there something perhaps we might do or recommend, that will give you assistance in that field?—A. The summer students enter a competition which they submit in December. By the time they are processed, by the Civil Service Commission it is well into March, and then, to initiate a complete clearance on top of that before we allow the student to enter this work, I am afraid he will have taken another job somewhere else. The mechanics of security clearance is somewhat unpredictable re the time required. In some cases it does not take very long. In other cases it takes quite a long time. The need for the students is quite evident and there are a lot of routine operations at which they can assist. Mr. Thunaes takes in about seven in the Radioactive Ores Division. Now, we do not go into complete clearance for them for the simple reason that they can attend to routine work primarily in the chemical laboratories. Frequently students are required by the universities to write a thesis on their summer work, and classified material doesn't lend itself to this practice.

Mr. MURPHY: Are they university students?

The WITNESS: Yes.

Mr. McCUSKER: How far have they proceeded in their studies at the university?

The WITNESS: We try to get them in their final year, when they have completed their third year, but our experience in the past few years has been that we are lucky if we can get them in their second year. Our bargaining power is not very extensive.

Mr. BROOKS: Are the universities giving any special courses in atomic energy subjects?

The WITNESS: Yes, in nuclear physics, but I do not know of any that are giving any courses in any phase of nuclear engineering.

By Mr. Murphy:

Q. Do you have any difficulty, Doctor, getting capable and efficient professional staff?—A. Yes. Again, our bargaining power is very limited by the Commission who sets the limits of salary, etc., and also the conditions that they must have so many years of experience. Unfortunately, we are losing quite an appreciable number of our key personnel who have been with the Mines Branch for several years after graduation.

Q. You mean, after a good man has been with you a short time, private industry takes him away?—A. That is what happens.

Q. For more money?—A. Definitely more money; in a few cases for double the salary.

Mr. BROOKS: Are they going to private industry in Canada or going to the United States?

The WITNESS: Most of them are staying in Canada.

By Mr. Green:

Q. Are you working with any mining company?—A. Outside of atomic energy?

Q. Pardon?—A. Do you mean firms other than those interested in the atomic energy project materials?

Q. Well, in connection with atomic energy.—A. Yes, but I think Mr. Thunaes will probably be able to answer that better than I can. There are quite a few companies who send in their samples for assay and we do concentrational work when the radioactive assay and reserves merit the additional service. Such work is going to increase, naturally, with private enterprise now entering into the atomic energy picture. From the metallurgical side of the question, most of these sheathing experiments that I mentioned, the sheathing of the metals: Procedures are worked out in the Mine Branch laboratories and then personnel from the outside firm are trained in the operations.

By Mr. Murphy:

Q. Do you have any contact or liaison, for instance with this development in Detroit between the Detroit Edison and Dow Chemical? Do you have any contact there? Is any department of government including atomic energy having contact or liaison with a project of that sort?—A. I do not know of any in Canada.

Q. The point I want to find out is, does any department of the Government of Canada, including Atomic Energy of Canada, Limited, have liaison with this project that is now being undertaken in Detroit?

The CHAIRMAN: I do not know that Doctor Convey can speak for Atomic Energy of Canada Limited. He can speak for his own department. That is for Dr. Mackenzie. Doctor Convey can speak for his own Department of Mines and Technical Surveys.

The WITNESS: We have not got any direct relationship with any firm on a contract basis, but we do have a very good liaison from the point of view of exchanging information.

Mr. GREEN: For example, did you work with Sherritt Gordon in connection with their experiments for processing their nickel ore?

The WITNESS: Yes, Sherritt Gordon did their original process work and small pilot plant operations in the Mines Branch, and even today we work very closely together.

By Mr. Murphy:

Q. Are there any publications coming today from behind the iron curtain?—A. Not that I know of.

Q. There is nothing to prevent them getting all the information that is published by us?—A. Anything that appears in the public press they are entitled to, but the major part of our work is classified.

By Mr. Gibson:

Q. Do you allow laboratory technicians to go into your laboratory, say, from Sherritt Gordon, this being one of the companies you mention? When they do work in your branch, are they cleared for security, or are they in a

different sphere?—A. If they come into a section which is cleared for security, we expect that that firm will clear their staff before they bring them in. If they do not, we refuse them admission.

Q. They actually come down and use your equipment there?—A. Under our direction.

Q. In which case, do you charge them anything for the use of your equipment?—A. Yes, there is a nominal charge in so far as any materials which they may use are concerned, any extra time, say, with respect to prevailing rates staff, and if we should require equipment that we do not possess for that particular project, then they must produce it and at the end of the project mutual arrangements are made for the disposal of the equipment, and experience has shown that it is an arrangement that benefits the Mines Branch.

Q. And it is quite satisfactory?—A. Absolutely. Then there is this point to consider that if we work upon a contract basis with some of these firms, whatever we do would be the property of that firm. Any information which would be obtained would be theirs, but as arrangements exist at the present, wherein we work on projects of mutual interest, the results which we obtain are ours to deal with subject to their approval. Naturally, we would not want to use results which are confidential, but we can carry over results from one project into another. This provides us with a flexible research unit.

Q. There might be another nickel mine, for instance, found in Canada and that information would be valuable to them and it would be made available to them?—A. Yes.

Mr. GREEN: Do you work with provincial mines branches at all?

The WITNESS: Yes, a good example of that is the work in metallurgy which we do in conjunction with the Ontario Mines Department. That is usually associated with projects that they have in the Ontario Research Foundation. In the Nova Scotia Department of Mines there are quite a few common projects there, particularly in the coal mining operations. There are none in atomic energy.

Mr. MURPHY: Have any other provinces that type of research committee? What is it called in Ontario?

The CHAIRMAN: The Ontario Research Foundation is the name of it.

The WITNESS: There is the Ontario Research Council, who have committees under them, but then there is the independent laboratory of the Ontario Research Foundation. I believe most of their funds are derived from the Ontario Research Council. I may be wrong on that, but there is a close link between them. I do not know of any similar set-up in any other province. Most of the other research councils concern themselves with local problems, through their respective research laboratories.

Mr. GIBSON: I wonder if I might be excused? I am sorry, gentlemen, because I find this most fascinating.

The CHAIRMAN: Well, now, another committee is sitting and three of our members want to go to it, so I guess that brings us to a conclusion for today. Are there any other questions you want to put to Doctor Convey?

Mr. MURPHY: I only wish I had been here at the start.

The CHAIRMAN: Thank you, Doctor Convey,



